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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,495	10/24/2002	Ronald Scott Bunker	839-1333	9074

30024 7590 12/30/2005

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EXAMINER

RODRIGUEZ, WILLIAM H

ART UNIT	PAPER NUMBER
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3746

DATE MAILED: 12/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/065,495	Applicant(s) BUNKER, RONALD SCOTT	
	Examiner William H. Rodriguez	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,8-11 and 14-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,8-11 and 14-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to the amendment and remarks filed 11/10/05. Since the examiner has applied new grounds of rejection, this office action is being made non-final to afford the applicant the opportunity to respond to the new grounds of rejection.

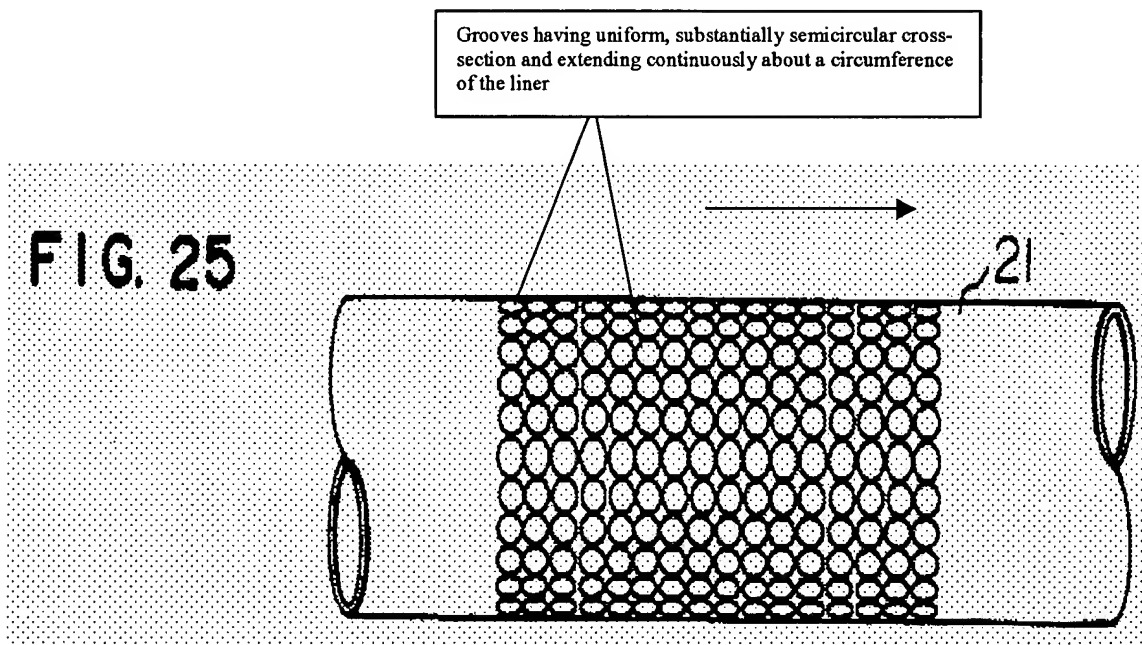
Claim Rejections - 35 USC § 102

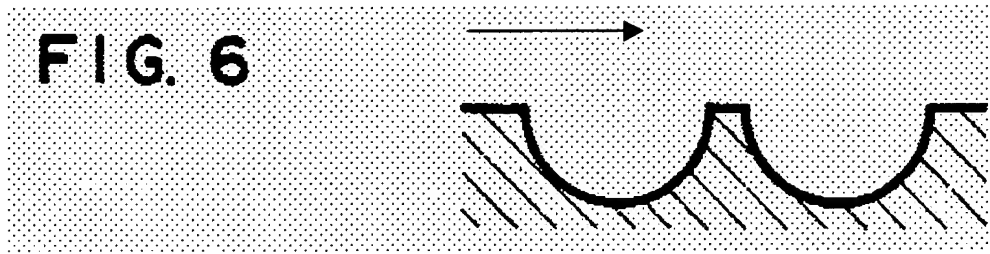
1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 3, 8, 10, 11 and 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by Hisajima et al. (US 5,577,555).





Note: The introductory phrase of the claim “*for a combustor liner*”, recites the possible intended use or purpose of the claimed invention but does not limit or add any patentable weight to the claim or help to distinguish the invention from the prior art being applied. A recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the structural limitations of the claims, as is the case here.

With respect to claim 1, **Hisajima** teaches a component/device/apparatus having a substantially cylindrical shape; and a plurality of axially spaced annular grooves 20 formed in an outside surface of said component, each groove having a uniform, substantially semi-circular cross-section and extending continuously about a circumference of the component. See particularly **Figures 3, 6 and 25**.

With respect to claim 3, **Hisajima** teaches said grooves 20 are arranged transversely to a direction of a flow. See particularly **Figure 25**.

With respect to claim 8, **Hisajima** teaches that the grooves are angled relative to a direction of a flow. See particularly **Figure 3** and cl. 5 ll.13-15.

With respect to claim 10, **Hisajima** teaches a component/device/apparatus having a substantially cylindrical shape; and a plurality of axially spaced annular grooves 20 formed in an outside surface of said component, each groove extending continuously about a circumference of said component; wherein said grooves are semi-circular in cross-section, based on a diameter D,

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and wherein a depth of said grooves is equal to about 0.05 to 0.50D. See particularly **Figures 3, 6 and 25**; and cl. 5 ll.13-15.

For instance, as taught in table 1 in column 5, if the diameter **D** is **1.18mm**, then the depth is **0.48mm**, which is within the range of **0.05D to 0.50D**.

$$0.48 * 0.05D = 0.024 \text{ mm} \quad \text{lower limit}$$

$$0.48 * 0.5 D = 0.59 \text{ mm} \quad \text{upper limit}$$

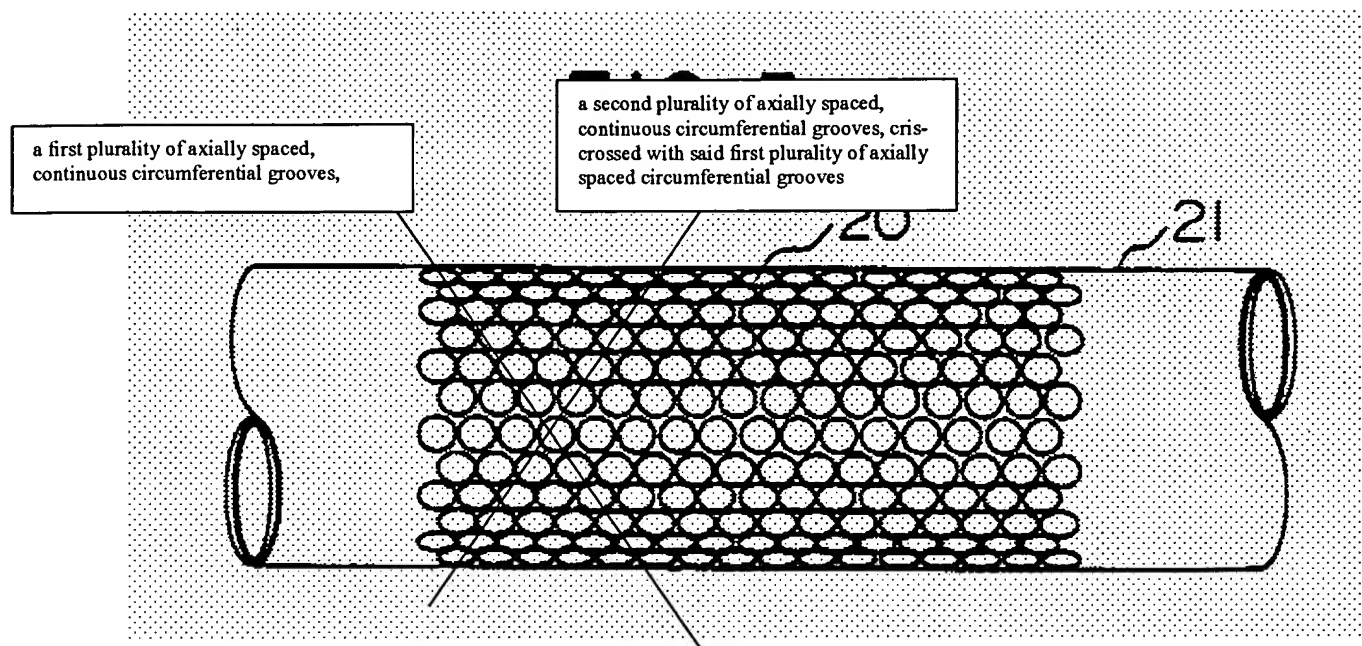
$$0.024 < 0.48 < 0.59$$

With respect to claim 11, **Hisajima** teaches that a center-to-center distance between adjacent grooves is equal to about 1.5-4D. See particularly cl. 5 ll.13-15.

With respect to claim 14, **Hisajima** teaches said grooves 20 are arranged transversely to a direction of a flow. See particularly **Figure 25**.

With respect to claim 15, **Hisajima** teaches that the grooves are angled relative to a direction of a flow. See particularly **Figure 3** and cl. 5 ll.13-15.

With respect to claim 16, **Hisajima** teaches a component/device/apparatus having a substantially cylindrical shape; a first plurality of axially spaced, continuous circumferential grooves formed in an outside surface of said component, angled relative to a direction of a flow and a second plurality of axially spaced, continuous circumferential grooves criss-crossed with said first plurality of axially spaced circumferential grooves, and wherein said first and second plurality of axially spaced circumferential grooves are smoothly curved in cross-section. See particularly **Figure 3** below.



Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 8-11 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Glezer et al.** (US 6,098,397) in view of **Hisajima et al.** (US 5,577,555).

With respect to claim 1, **Glezer** teaches a combustor liner for a gas turbine, the combustor liner having a substantially cylindrical shape; and a plurality of axially spaced grooves 84 “concavities”, said grooves having a semi-circular cross-section and extending about a circumference of the liner (see particularly **Figure 2** of **Glezer**). **Glezer** does not teach that said grooves 84 extend continuously about a circumference of the liner. However, **Hisajima**

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teaches a device comprising a plurality of axially spaced annular grooves 20 formed in an outside surface of said device, each groove having a uniform, substantially semi-circular cross-section and extending continuously about a circumference of the device (see particularly **Figures 3, 6 and 25** of Hisajima). Since **Hisajima's** annular grooves 20 extend continuously about the circumference of the device these provide a continuous heat transfer enhancement over the entire outer surface of the device rather than a discrete (only certain areas) heat transfer as in Glezer. After recognizing these advantages and knowing that any heat transfer enhancement in a combustor liner would have resulted in an improved thermal performance and a longer operating life for the liner and the combustor, a combustor designer would have been motivated to have used Hisajima's continuous heat transfer teachings for combustors. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the teachings of Hisakima and have provided Glezer's combustor liner with a continuous heat transfer enhancement (grooves extending continuously about a circumference of the liner) in order to further enhance the cooling of the combustor liner and to extend its operating life.

With respect to claim 3, **Glezer** in view of **Hisajima** teaches said grooves 20 are arranged transversely to a direction of a flow. See particularly **Figures 1** of Glezer and **Figure 25** of Hisajima.

With respect to claim 8, **Glezer** in view of **Hisajima** teaches that the grooves are angled relative to a direction of a flow. See particularly **Figures 1** of Glezer and **Figure 25**; cl. 5 ll.13-15 of Hisajima.

With respect to claims 9 and 16, **Glezer** teaches a combustor liner for a gas turbine, the combustor liner having a substantially cylindrical shape; a flow sleeve surrounding said liner, a first plurality of axially spaced, continuous circumferential grooves formed in an outside surface of said component, angled relative to a direction of a flow and a second plurality of axially spaced, continuous circumferential grooves criss-crossed with said first plurality of axially spaced circumferential grooves, and wherein said first and second plurality of axially spaced circumferential grooves are smoothly curved in cross-section (see particularly **Figure 3** of **Glezer** above). **Glezer** does not teach that said grooves 84 extend continuously about a circumference of the liner. However, **Hisajima** teaches a device comprising a plurality of axially spaced annular grooves 20 formed in an outside surface of said device, each groove having a uniform, substantially semi-circular cross-section and extending continuously about a circumference of the device (see particularly **Figures 3, 6 and 25** of **Hisajima**). Since **Hisajima's** annular grooves 20 extend continuously about the circumference of the device these provide a continuous heat transfer enhancement over the entire outer surface of the device rather than a discrete (only certain areas) heat transfer as in **Glezer**. After recognizing these advantages and knowing that any heat transfer enhancement in a combustor liner would have resulted in an improved thermal performance and a longer operating life for the liner and the combustor, a combustor designer would have been motivated to have used **Hisajima's** continuous heat transfer teachings for combustors. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the teachings of **Hisajima** and have provided **Glezer's** combustor liner with a continuous heat transfer enhancement (grooves extending

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continuously about a circumference of the liner) in order to further enhance the cooling of the combustor liner and to extend its operating life.

With respect to claim 10, **Glezer** teaches a combustor liner for a gas turbine, the combustor liner having a substantially cylindrical shape; and a plurality of axially spaced grooves 84 “concavities”, said grooves having a semi-circular cross-section and extending about a circumference of the liner (see particularly **Figure 2** of Glezer). **Glezer** does not teach that said grooves 84 extend continuously about a circumference of the liner. However, **Hisajima** teaches a device comprising a plurality of axially spaced annular grooves 20 formed in an outside surface of said device, each groove having a uniform, substantially semi-circular cross-section and extending continuously about a circumference of the device (see particularly **Figures 3, 6 and 25** of Hisajima). Since **Hisajima’s** annular grooves 20 extend continuously about the circumference of the device these provide a continuous heat transfer enhancement over the entire outer surface of the device rather than a discrete (only certain areas) heat transfer as in Glezer. After recognizing these advantages and knowing that any heat transfer enhancement in a combustor liner would have resulted in an improved thermal performance and a longer operating life for the liner and the combustor, a combustor designer would have been motivated to have used Hisajima’s continuous heat transfer teachings for combustors. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used the teachings of Hisajima and have provided Glezer’s combustor liner with a continuous heat transfer enhancement (grooves extending continuously about a circumference of the liner) in order to further enhance the cooling of the combustor liner and to extend its operating life.

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Further, **Glezer** in view of **Hisajima** teach that the depth of said grooves is equal to about 0.05 to 0.50D. See particularly **Figures 1** of Glezer and **Figure 25**; cl. 5 ll.13-15 of Hisajima.

For instance, as taught in table 1 in column 5, if the diameter **D** is 1.18mm, then the depth is 0.48mm, which is within the range of 0.05D to 0.50D.

$$0.48 * 0.05D = 0.024 \text{ mm} \quad \text{lower limit}$$

$$0.48 * 0.5 D = 0.59 \text{ mm} \quad \text{upper limit}$$

$$0.024 < 0.48 < 0.59$$

With respect to claim 11, **Glezer** in view of **Hisajima** teaches that a center-to-center distance between adjacent grooves is equal to about 1.5-4D. See particularly cl. 5 ll.13-15 of Hisajima.

With respect to claim 14, **Glezer** in view of **Hisajima** teaches said grooves 20 are arranged transversely to a direction of a flow. See particularly **Figures 1** of Glezer and **Figure 25** of Hisajima.

With respect to claim 15, **Glezer** in view of **Hisajima** teaches that the grooves are angled relative to a direction of a flow. See particularly **Figures 1** of Glezer and **Figure 25**; cl. 5 ll.13-15 of Hisajima.

Allowable Subject Matter

5. The indicated allowability of claims 9 and 16 is withdrawn in view of the reference(s) to **Hisajima et al. (US 5,577,555)** and **Glezer et al. (US 6,098,397)**. See detailed rejected above.

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Response to Arguments

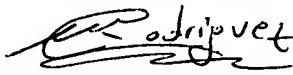
6. Applicant's arguments with respect to claims 1, 3, 8, 10, 11, 14 and 15 have been considered but are moot in view of the new ground(s) of rejection.

Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William H. Rodriguez whose telephone number is 571-272-4831. The examiner can normally be reached on Monday-Friday 7:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on 571-272-4444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


William H. Rodriguez
Primary Examiner
Art Unit 3746

12/21/05